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shark. It is, accordingly, by no means to be accepted that these creatures are nearly akin to *Limulus*, even if cases of superficial resemblance be pointed out. For the general outward shape of *Limulus* may be acquired independently by creatures of very different groups, even to a certain degree among vertebrates by rays and siluroids. On the other hand, it is clear that ammocetes should be compared at first not with a Paleozoic form of dubious kinship, but with other cyclostomes, especially with the hag-fishes, which Gaskell rarely mentions. The fact is that after comparison with the latter forms, we are less inclined to regard the ammocete as a primitive and unmodified creature. For we find that the hag-fishes have no metamorphosis, and we may, therefore, more easily harbor the suspicion that the exceptional sand-living life habit of the larval lamprey has been responsible for many of its curious features, and that these have no wider phylogenetic bearings than have, for example, the peculiar larvalisms developed by many teleosts. But let us not go into details. The momentous problem of vertebrate beginnings is still "on the knees of the gods." We gravely doubt whether Gaskell's book will be of great value in dislodging it.

BASHFORD DEAN

Modern Thought and the Crisis in Belief.

The Baldwin Lectures, 1909. By R. M. WENLEY. New York, Macmillan. 1909. Pp. ix + 364.

This volume results from the nomination of Professor Wenley by the Protestant Episcopal Bishop of Michigan to give a series of lectures in an endowed course "for the Establishment and Defence of Christian Truth." The circumstance will, perhaps, not especially commend the book to the interest of some readers of this journal. Few ways of spending money seem to some modern minds less desirable, or more productive of ethically awkward situations, than the creation of permanent foundations for scholarly inquiries or discussions, whose results are predetermined by the terms of the endowment supporting them; this is true whether the predetermined result be the truth of Christianity or the truth of socialism.

With old foundations of this sort we must do the best we can; but it is a somewhat regrettable anachronism that new ones should appear in recent years, and in connection with American universities. One can hardly suppose that the Christian truths which Professor Wenley establishes and defends would have been recognized as such by the episcopal founder of the lectureship, no longer ago than 1885. The book is almost equally divided into a destructive criticism of religious beliefs still current, and philosophical reconstruction; but one apprehends more clearly what it is that is destroyed than what it is that is constructed. The best, and the longest, division of the book deals with a topic that does not call for discussion here: the religious consequences of historical criticism; the outcome is a frank abandonment of the historical character and content of Christianity, and the transfer of interest from a historic teacher to a "metahistorical Christ." The precise ontological status of this entity, and its relation to the historic Jesus, remain obscure to the present reviewer. The other main division of the book concerns the religious bearings and the philosophic validity of the "natural science view of the world"—the doctrine unfortunately labeled by Ward "naturalism," by which appears to be meant a mechanistic cosmology, biology and psychology taken as equivalent to a complete account of the nature of reality. With this, Professor Wenley vigorously argues, religious thought must now have a definite reckoning; for while historical criticism can destroy nothing essential to religion—since nothing historical is essential to religion—naturalism is the "executioner of the ideal life." Since the refutation of naturalism is presented as the main task, not only of this book, but of the present age, one is disappointed to find Professor Wenley devoting expressly to it only some forty pages—one ninth of his space. It should be said, however, that the author regards the task as one for the most part already accomplished, by Ward's "Naturalism and Agnosticism," which he here, so to say, reënacts. His own argument rests chiefly upon two points: (1) Every science begins by deliberately abstracting certain as-

pects of the world from their context, which none the less really conditions them; the conclusions, therefore, of any science become, if generalized and made applicable to the whole, not only inadequate but self-contradictory. (2) Likewise, if the generalized results of science conflict with ideal interests they stultify themselves; for the abstraction from which they arose was for the sake of an ideal. While the reviewer sympathizes with much in Professor Wenley's doctrine, he does not think these arguments calculated to convince. (1) To say that the conclusions reached primarily by segregating and analyzing a certain aspect or type of phenomena are *necessarily* inapplicable and absurd beyond the limits of that segregation, is to say that no unification of knowledge is possible at all. Science assumes that phenomena seemingly complex and diverse can ultimately be understood as special variations—under conditions also generalizable—of a simple and homogeneous type-phenomenon, or of a few such. This assumption is very possibly unwarranted; but it is not comic, and it is not to be disposed of by so easy a piece of dialectic as that employed by the author. (2) Many principles of science are undoubtedly postulated ideal demands. There is no necessary paradox in the opposition of these intellectual ideals to ideals of another order and origin. The question—which this book does not very explicitly discuss—is: When they conflict, which has the right of way?

One could wish that Professor Wenley would be persuaded to chasten his style. At its best it is admirably vigorous and effective; but there are moments in which it seems a cross between the style of the Delphian oracle and that of Mr. George Ade. In such passages the simple, precise and natural expression is laboriously avoided in the interest of strange archaisms and neologisms and a general grandiloquent incomprehensibility. Thus the reader is told that "a mystic element is the *leit motiv* of the fiducial process"; what he is expected to gather is uncertain, but the reference at any rate is *not* to the religious propensities of bankers. One learns of "the æonic means whereby acute need for God is

brought home to the secular group"; one is warned that "while it would be sheer ingratitude to lightly these [historical] investigations, it is quite another affair to train with their representatives when," etc.; one is assured that "God is the normative content of human life"; and one makes the acquaintance of such supernumeraries of our speech as "to gift a procedure" (meaning, simply, to give a procedure), "derivant" (for derivative), "a quantitative phantasmagoria," "misfortunately," "his near kith."

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ON THE NATURE AND POSSIBLE ORIGIN OF THE MILKY WAY¹

WHILE the milky way has long been recognized as a relatively thin segment of space in which stars appear more numerous than elsewhere, no satisfactory explanation has been offered for the existence of such a segment with the earth apparently at its center or for any of its characteristic peculiarities of aspect and relationship to the stars as a whole. Noteworthy among the features calling for explanation are the following: The milky way is a belt approximately following a great circle of the sky but broad and diffuse throughout one half of its course while relatively narrow and well defined on the opposite side. The broad half of the belt is cleft in two by a dark lane running along its axis and in addition contains numerous rifts and holes from which the narrow half is relatively free. The number of stars per unit area of the sky is a maximum in the milky way and diminishes progressively on either hand, while the inverse relation is true for the nebulae, their frequency increasing with increasing distance from the milky way.

It is shown in the present paper that all these peculiarities are immediate results of the supposition that the visible universe consists in the main of two distinct but interpenetrating parts, the first of which is a chaos of indefinite extent in which stars and cosmic

¹ Abstract of paper read at the April meeting of the National Academy of Sciences by George C. Comstock.